24. (Not Currently Amended) A method for manufacturing a liquid discharge recording head provided with a main body portion having liquid discharge ports, and pressure chambers with opening portions on parts thereof, being connected with the liquid discharge ports, respectively, and piezoelectric vibrating portions installed to close the opening portions, respectively, said method comprising the steps of:

forming a vibrating plate and an electrode on a substrate;

forming on the electrode a piezoelectric film containing (i) a first layer having a perovskite structure containing lead and titanium and (ii) a second layer having a perovskite structure containing zirconium, lead, and titanium, the amount of zirconium contained in the first layer being one of zero and an amount less than the amount of zirconium contained in the second layer, by forming on the electrode the first layer, setting a temperature of at least 500°C and forming the second layer on the first layer at the set temperature, and then providing quick cooling to reduce the temperature at least to 450°C with a cooling speed of at least 30°C/minute;

after the formation of the piezoelectric film, dividing the piezoelectric film into portions corresponding to the pressure chambers;

forming an upper electrode, and the pressure chambers corresponding to the portions of the divided piezoelectric film; and

bonding a nozzle plate having liquid discharge ports formed therefor.

25. (Not Currently Amended) A method for manufacturing a liquid discharge recording head provided with a main body portion having liquid discharge ports, and pressure

chambers with opening portions on parts thereof, being connected with the liquid discharge ports, respectively, and piezoelectric vibrating portions installed to close the opening portions, respectively, said method comprising the steps of:

forming on a supporting substrate piezoelectric vibrating portions having a piezoelectric film containing (i) a first layer having a perovskite structure containing lead and titanium and (ii) a second layer having a perovskite structure containing zirconium, lead, and titanium, the amount of zirconium contained in the first layer being one of zero and an amount less than the amount of zirconium contained in the second layer, by forming on the supporting substrate the first layer, setting a temperature of at least 500°C and forming the second layer on the first layer at the set temperature, and then providing quick cooling to reduce the temperature at least to 450°C with a cooling speed of 30°C/minute;

bonding without using an adhesive agent a circumference of each of the opening portions of the main body portion with a circumference of each of the piezoelectric vibrating portions by arranging the opening portions and the piezoelectric vibrating portions to face each other, respectively; and

removing the supporting substrate subsequent to said bonding step.

26. (Not Currently Amended) A method for manufacturing a liquid discharge recording head according to Claim 24, further comprising forming the first layer, second layer, vibrating plate, and electrode by a vapor method including sputtering and a CVD method.

27. (Twice Amended) A method for manufacturing a liquid discharge recording head according to Claim 24, wherein the piezoelectric film is processed by etching using a strong acid solution.

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28. (Twice Amended) A method for manufacturing a liquid discharge recording head according to Claim 24, wherein a silicon substrate is used as the substrate, and the substrate is removed by etching using hydrofluoric acid solution or potassium hydroxide solution to form the pressure chambers therein.

61. (Not Amended) A method for manufacturing a liquid discharge recording head according to Claim 24, further comprising forming an intermediate layer in contact with the first layer and the second layer and residing between the first layer and the second layer, the zirconium concentration of the intermediate layer increasing inclinatorily from the first layer to the second layer.

62. (Not Amended) A method for manufacturing a liquid discharge recording head according to Claim 24, further comprising forming the vibrating plate from at least one material selected from the group of materials including nickel, chromium, aluminum, titanium, zirconium, the group of oxides thereof or nitrides thereof, silicon, silicon oxide, polymer organic materials, and YSZ, or from a laminated member formed from at least one of the materials selected from the same group of materials.

63. (Not Amended) A method for manufacturing a liquid discharge recording head according to Claim 24, further comprising forming the vibrating plate with vibrating plate characteristics by ion injection on an upper part of the main body portion to form the pressure chambers.

64. (Not Amended) A method for manufacturing a liquid discharge recording head according to Claim 24, further comprising forming the vibrating plate on the substrate with epitaxial development, wherein the substrate is a silicon monocrystal substrate.

65. (Not Amended) A method for manufacturing a liquid discharge recording head according to Claim 24, further comprising forming the electrode and the upper electrode of platinum, iridium, conductive oxide, or conductive nitride, and so as to be arranged on either side of the piezoelectric film.

66. (Not Amended) A method for manufacturing a liquid discharge recording head according to Claim 24, further comprising forming the electrode and the upper electrode so as to be arranged on either side of the piezoelectric film, and dividing at least one of the electrode and the upper electrode for installation corresponding to the pressure chambers in order to structure the piezoelectric vibrating portions for each of the pressure chambers.

67. (Not Amended) A method for manufacturing a liquid discharge recording head according to Claim 24, further comprising forming one of the electrode and the upper electrode on each of the portions of the divided piezoelectric film.

68. (Not Amended) A method for manufacturing a liquid discharge recording head according to Claim 25, further comprising forming an intermediate layer in contact with the first layer and the second layer and residing between the first layer and the second layer, the zirconium concentration of the intermediate layer increasing inclinatorily from the first layer to the second layer.

69. (Not Amended) A method for manufacturing a liquid discharge recording head according to Claim 25, further comprising providing the piezoelectric vibrating portions with a vibrating plate.

70. (Not Amended) A method for manufacturing a liquid discharge recording head according to Claim 69, further comprising forming the vibrating plate from at least one material selected from the group of materials including nickel, chromium, aluminum, titanium, zirconium, the group of oxides thereof or nitrides thereof, silicon, silicon oxide, polymer organic materials, and YSZ, or from a laminated member formed from at least one of the materials selected from the same group of materials.

71. (Not Amended) A method for manufacturing a liquid discharge recording head according to Claim 69, further comprising forming the vibrating plate with vibrating plate characteristics by ion injection on an upper part of the main body portion to form the pressure chambers.

72. (Not Amended) A method for manufacturing a liquid discharge recording head according to Claim 69, further comprising forming the vibrating plate on a silicon monocrystal substrate with epitaxial development.

73. (Not Amended) A method for manufacturing a piezoelectric element structure having a supporting substrate and a piezoelectric film supported on the supporting substrate, said method comprising the steps of:

forming on the supporting substrate, in this order, a first layer having a perovskite structure and a second layer having a perovskite structure and zirconium, the temperature at the time of formation of the first and second layers being at least 500° C, and the first layer being formed so as to contain an amount of zirconium equal to one of zero and an amount less than the amount of zirconium contained in the second layer; and

cooling from the formation temperature at least to 450°C with a cooling speed of at least 30°C/minute.

74. (Not Amended) A method for manufacturing a piezoelectric element structure according to Claim 73, further comprising forming an intermediate layer in which the

zirconium concentration increases inclinatorily from the first layer to the second layer, after the formation of the first layer and before the formation of the second layer.

75. (Not Amended) A method for manufacturing a piezoelectric element structure according to Claim 73, wherein in the forming step the ratio of zirconium/titanium in the second layer is set to be at least 30/70 and at most 70/30.

76. (Not Amended) A method for manufacturing a piezoelectric element structure according to Claim 73, wherein the piezoelectric film is one of a mono-orientational crystal and a monocrystal.

77. (Not Amended) A method for manufacturing a piezoelectric element structure according to Claim 73, further comprising forming the piezoelectric film so as to have an orientation in the direction (100).

78. (Not Amended) A method for manufacturing a piezoelectric element structure according to Claim 73, further comprising arranging an electrode on each side of the piezoelectric film, forming the piezoelectric film so as to have an orientation in the direction (111), and forming the electrodes to be comb-shaped or to be arranged on an entire face of the piezoelectric film.

79. (Not Amended) A method for manufacturing a piezoelectric element structure according to Claim 73, further comprising forming the piezoelectric film so as to have a thickness of at most 10 μm.

80. (Not Amended) A method for manufacturing a piezoelectric element structure according to Claim 73, further comprising forming the piezoelectric film so as to have a thickness of at least 1 μm and at most 4 μm.

81. (Not Amended) A method for manufacturing a piezoelectric element structure according to Claim 73, further comprising forming the first layer of the piezoelectric film so as to have a thickness of at least 30 nm and at most 100 nm.

82. (Not Amended) A method for manufacturing a piezoelectric element structure according to Claim 73, wherein the second layer of the piezoelectric film contains niobium, tin, and manganese, and provides antiferroelectric characteristics.

83. (Not Amended) A method for manufacturing a piezoelectric element structure having a supporting substrate and a piezoelectric film supported on the supporting substrate, said method comprising the steps of:

forming on the supporting substrate, in this order, a first layer having a perovskite structure and a second layer having a perovskite structure and an element for preventing crystallization growth during a thin film forming process, the temperature at the time of